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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/667,230 | 09/18/2003 | Byong-Ho Park | S02-093 | 7005 |
| 7590 | 11/25/2005 | | EXAMINER | |
| Marek Alboszta LUMEN 2345 Yale Street 2nd Floor Palo Alto, CA 94306 | | | KASZTEJNA, MATTHEW JOHN | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 3739 | |

DATE MAILED: 11/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/667,230

Applicant(s)

PARK ET AL.

Examiner

Matthew J. Kasztejna

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-39 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 August 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Disposition of Claims

In response to the amendment filed on August 25, 2005, amended claims 6, 13, 15-17 and 29 are acknowledged. The objections to the drawings are withdrawn. The current rejections are *withdrawn*. The following new grounds of rejection are set forth:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-6, 10, 26, 29 and 31 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,749,560 to Konstorum et al.

In regards to claims 1, 26 and 29, Konstorum et al. disclose a compliant apparatus comprising: a tubular structure 40 formed from a tube made of a material having a reversible structural behavior, and at least one compliant mechanism also formed from the tube as part of the tubular structure; wherein the compliant apparatus has no mechanical joints; and wherein the compliant apparatus is capable of being controlled to maneuver reversibly in various motions and degree-of-freedom without permanent deformation (see Col. 3, Lines 1-28 and Figs. 1-3)

In regards to claim 2, Konstorum et al. disclose a compliant apparatus, wherein the cross-section of the tube is characterized as circular (see Fig. 2)

In regards to claim 3, Konstorum et al. disclose a compliant apparatus, wherein the reversible structural behavior is characterized as elastic or superelastic (see Col. 1, Lines 20-24).

In regards to claim 4, Konstorum et al. disclose a compliant apparatus, wherein the material is selected from the group consisting of an elastic alloy including stainless steel and titanium alloy, and a superelastic alloy including nitinol, Cu--Al--Ni, Cu--Al, Cu--Zn--Al, Ti--V and Ti--Nb alloy (see Col. 3, Lines 15-18).

In regards to claim 5, Konstorum et al. disclose a compliant apparatus, wherein the compliant mechanism inherently stores strain energy and utilizes the stored energy as a bias force for shape recovery (see Col. 3, Lines 20-25).

In regards to claim 6, Konstorum et al. disclose a compliant apparatus, further comprising at least one actuator 24a-b (see Figs. 2-3).

In regards to claims 10 and 31, Konstorum et al. disclose a compliant apparatus, wherein the at least one actuators are characterized as wires connected to an external apparatus and actuated remotely via the external apparatus (see Col. 2, Lines 35-63).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 7-9, 11, 14, 18-25, 27-28, 30 and 32-38 rejected under 35 U.S.C.

103(a) as being unpatentable over U.S. Patent No. 6,110,121 to Lenker in view of U.S. Patent No. 6,749,560 to Konstorum et al.

In regards to claims 1, 18-20 and 37, Lenker discloses an ultrasonic imaging system useful for intravascular ultrasound forward imaging applications, the ultrasonic imaging system comprising: a compliant apparatus having no mechanical joints and capable of being manipulated in various motions and degree-of-freedom without permanent deformation (see Fig. 3), the compliant apparatus comprising: a tubular structure 102 formed from a tube made of a material having a reversible structural behavior; and at least one compliant mechanism integrally formed from the tube (see Fig. 4); an ultrasound transducer 104 coupled to the compliant apparatus; and at least one actuator 42 attached to the compliant apparatus for manipulating the compliant apparatus and the at least one compliant mechanism (see Col. 4, Lines 40-67). However, Lenker is silent with respect to the compliant apparatus having no mechanical joints. Konstorum et al. teach of an analogous endoscopic apparatus having a tubular structure 40 formed from a tube made of a material having a reversible structural behavior, and at least one compliant mechanism also formed from the tube as part of the tubular structure; wherein the compliant apparatus has no mechanical joints; and wherein the compliant apparatus is capable of being controlled to maneuver reversibly in various motions and degree-of-freedom without permanent deformation (see Col. 3, Lines 1-28 and Figs. 1-3). It would have been obvious to one skilled in the art at the

time the invention was made to construct the compliant mechanism in the apparatus Lenker with no mechanical joints to simplify the structure of the tubular structure and still provide adequate column strength, flexibility and torque resistance to be inserted into a patient's body as taught by Konstorum et al.

In regards to claims 7-8, 21, 27 and 30, Lenker discloses a compliant apparatus, wherein the at least one actuators are made of Shape Memory Alloys (SMAs) and wherein the SMAs are based on shape memory effects including contraction, rotation, and a combination thereof (see Col. 4, Lines 50-60).

In regards to claims 9 and 22, Lenker discloses a compliant apparatus, wherein the at least one actuators are characterized as piezoelectric or electro-active polymer actuators (se Col. 5, Lines 7-18).

In regards to claims 10-11, 23, 28 and 31, Lenker discloses a compliant apparatus, wherein the at least one actuators are characterized as wires connected to an external apparatus and actuated remotely via the external apparatus 30 (see Col. 5, Lines 31-46).

In regards to claim 14, Lenker discloses a compliant apparatus, further comprising at least one built-in micro structure selected from the group consisting of a welding-enabling structure and a clamping-enabling structure (see Figs. 4-5).

In regards to claims 24-25 and 32-36, Lenker discloses an ultrasonic imaging system further comprising: two additional actuators configured to actuate the compliant apparatus in an orthogonal direction, enabling the compliant apparatus to provide the

ultrasound transducer with full three dimensional scanning motions (see Col. 5, Lines 7-57).

In regards to claims 38, Lenker discloses a system, further comprising a cooling system coupled to the micromanipulator for regulating the temperature thereof (see Col. 5, Lines 32-46).

Claims 12-13 and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,749,560 to Konstorum et al. in view of U.S. Patent No. 5,873,906 to Lau et al.

In regards to claims 12-13 and 15-17, Konstorum et al. disclose a compliant apparatus comprising: a tubular structure 40 formed from a tube made of a material having a reversible structural behavior, and at least one compliant mechanism also formed from the tube as part of the tubular structure; wherein the compliant apparatus has no mechanical joints; and wherein the compliant apparatus is capable of being controlled to maneuver reversibly in various motions and degree-of-freedoms without permanent deformation (see Col. 3, Lines 1-28 and Figs. 1-3). However, Konstorum et al. are silent with respect to a method of forming the compliant structure and tubular structure out of a tube with laser machining. Lau et al. teach of an endoscope device which is fabricated via laser cutting (see Col. 12, lines 40-46). It would have been obvious to one skilled in the art at the time the invention was made to fabricate the apparatus of Konstorum et al. via laser cutting to ensure precise and efficient manufacturing as taught by Lau et al. and is well known in the art.

Claim 39 rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,110,121 to Lenker in view of U.S. Patent No. 6,749,560 to Konstorum et al. in further view of U.S. Patent No. 5,482,029 to Sekiguchi et al.

In regards to claim 39, Lenker and Konstorum et al. disclose a compliant apparatus but are silent with respect to wherein the cooling system comprises a pumping means and biocompatible cooling fluid; and wherein the pumping means provides a constant flow of the cooling fluid to the micromanipulator to prevent the at least one actuators from overheating. Sekiguchi et al. teach of an analogous system having a method of flowing cooling water through the tubes (see Col. 13, Lines 13-60). It would have been obvious to one skilled in the art at the time the invention was made to include a cooling system in the apparatus of Lenker and Konstorum et al. having a biocompatible cooling fluid to prevent overheating of the actuators as taught by Sekiguchi et al.

Response to Arguments

Applicant's arguments with respect to claims 1-39 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Kasztejna whose telephone number is (571) 272-6086. The examiner can normally be reached on Mon-Fri, 8:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Linda C.M. Dvorak can be reached on (571) 272-4764. The fax phone

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number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MJK



11/21/05



BEVERLY M. FLANAGAN
PRIMARY EXAMINER